not very clearly brought out. Yet fractional pitch is very generally used in motors of American manufacture.

The chapters on the Design of Small Motors for Manufacture in Large Quantities and on Cost and Weight Coefficients are of undoubted value in concentrating attention on the factors which govern the expense, although the actual values being based on foreign practise would not be of great value to an American engineer.

In a book on design as comprehensive as this it seems a pity that some space is not devoted to the mechanical design. It is to be regretted that designers of the electrical features of apparatus are so dependent on the mechanical engineer to put their designs and ideas into execution.

Considerable space is given to the single-phase motor both of the induction, series and repulsion types, with the addition of very good introduction stating the logical limitations of the single-phase system.

The author and publishers should be congratulated on the excellent work shown in the cuts and curves which contribute considerably to the value of the data included in the book. This is really very extensive and alone would make the book of great value to the designing engineer as a book of reference.

WALTER I. SLICHTER

Testing of Electromagnetic Machinery. By B. V. SWENSON and B. FRANKENFIELD. New York, The Macmillan Co. 1911.

This volume is devoted to the testing of alternating-current machinery and is a sequel to the book on "Direct Current Machinery," previously published by the same authors. The book contains a description of a very large number of practical experiments illustrating the phenomena of alternating-current circuits and methods of testing commercial apparatus. It is intended to be used in technical schools in connection with a laboratory course.

The general scheme and methods are based upon the work which has been carried on in the laboratory of the University of Wisconsin under the authors, and contains additions and revisions due to the experience of Professor Bryant at the University of Illinois.

As a result of this collaboration and experience the text covers the field very completely and the methods advocated are those that would be generally conceded as the best and most practical.

The book is quite up to date both in its methods and in its scope, thus a treatment of the mercury arc rectifier and the split-pole converter are included, although the treatment of the latter is very brief.

It may be suggested that the experiments are resolved into too elementary and simple divisions and that a more efficient use of the student's time would be obtained by combining several of the experiments into one operation. There are 127 experiments listed, very few of which could be omitted from a good course, but these 127 could be logically grouped to cover the same ground in fewer operations.

For the theoretical basis and explanation of each experiment, the student is referred to a very large number of references in each experiment. The number of these references will in itself tend to discourage the average student to give any of them proper attention. It would be of more benefit to the student if a simple and concise development of the theory were included in the text with each experiment. However, for instructors in charge of courses these references so systematically arranged will be of great use.

WALTER I. SLICHTER

Economic Geology, with Special Reference to the United States. By HEINRICH RIES, Ph.D. Third edition. New York, The Macmillan Co. 1910. Pp. xxxiv + 589, pls. LVI., figs. 237. $3.50.

The importance of geology in its relations with mineral resources was recognized nearly a century ago in the establishment of official surveys. Still earlier in the European schools of mines the formation and classification of ore deposits were discussed in formal courses of lectures. But the growing development of agriculture, quarrying and mining has brought the science of geology more and more into the